Claims

1. Method for producing at least one small opening (10, 33, 47) in a layer on a substrate (1, 41), in particular a semiconductor substrate, the substrate (1, 41) being provided on the upper side (2) with at least one tapering recess (6), which has a tip portion (4) and side walls (5), the upper side (2) of the substrate (1, 41) being covered at least in the region of the recess (6) with a layer (7, 42) made of an etchable material and the opening (10, 33, 47) being then produced in the region of the tip portion (4) of the recess (6) by etching of the layer (7, 42), characterised in that the opening (10, 33, 47) is produced from the upper side (2) by selective opening of the layer (7, 42) by means of an anisotropic plasma etching method which is matched to the material of the layer (7, 42), the material, the etching gases and the etching parameters being chosen such that, in the region of a tip portion (9, 31) of the layer (7, 42) of the recess (6, 30), which tip portion (9, 31) lies in the tip portion (4) of the substrate (1, 41), a greater etching rate is produced than in the region of side walls (8, 32) of the layer (7, 42) which lie on the side walls (5) of the substrate (1, 41).

2. Method according to claim 1, characterised in that silicon is used as substrate (1, 41) and silicon dioxide as the material of the layer (7, 42).

3. Method according to claim 2, characterised in that a silicon substrate (1, 41) with a (001) face is used as upper side.

4. Method according to one of the claims 1 to 3, characterised in that the plasma etching method is implemented using argon and trifluoromethane.

5. Method according to claim 1, characterised in that germanium, gallium arsenide or indium phosphide is used as substrate.

6. Method according to one of the claims 1 to 5, characterised in that the substrate (1, 41), subsequent to the production of the opening (10, 33, 47), is subjected to a deep etching step using the layer (7, 42) as etching mask.

7. Method according to claim 6, characterised in that the substrate (41) is provided with a through-opening (52) by means of deep etching.

8. Method according to one of the claims 1 to 7, characterised in that the substrate (41) is provided on the upper side with a plurality of channel-like and/or pyramid-like recesses (43, 44, 45) and with a layer (42) which covers these, and in that a corresponding plurality of openings (47) is configured in the layer (42) using the method according to one or more of the claims 1 to 5.

9. Method according to claim 8, characterised in that the substrate is provided with a corresponding plurality of through-openings (52), using a deep etching step and the layer (42) as mask.

10. Method according to one of the claims 1 to 9, characterised in that a plane-parallel disc is used as substrate (1, 41).

11. Method according to one of the claims 1 to 10, characterised in that at least one opening is applied at least on one edge, in a subsequent method step a further layer with preselected properties.

12. Method according to one of the claims 1 to 11, characterised in that at least one opening is configured in a free portion of a bending beam which is fixed on one side.

13. Calibration standard for scanning probe microscopy, characterised in that it comprises a plane-parallel substrate (41) with a plurality of through-openings (52) which are produced with the method according to one or more of the claims 1 to 11.

14. Micromechanical sensor with a bending beam (62), which is fixed on one side and is provided at one free end with a tip, characterised in that the tip

(31) has an opening (33) which is produced according to the method according to one or more of the claims 1 to 11.

15. Component part for electrical/optical transmission of electrical/optical signals, characterised in that it is produced according to the method according to one of the claims 9 to 11, the openings (52) being filled with a conductive or dielectric material.